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AGRICULTURAL MEMORANDUM NO 422

ESTIMATION OF MILDEW SPORE RELEASE - ALTERNATIVE METHODS L P SMITH

Following Ag Memos 419 and 420, two additional models of spore-weather relationships were tried.

1. The actual spore catches were adjusted approximately for current weather to standards of 18°C day maximum, 7 hours sunshine and 120 miles run-of-wind by the use of factors of 50 per degree, 25 per hour and 25 per 10 miles a day respectively.

The parameter for previous spore release was the one used in Ag Mem 420, namely the total catch 5, 6 and 7 days previously plus the total released 10 days or more previously.

Averaging the adjusted catch over various ranges of previous release:-

<u>Previous Release</u>	<u>Mean Adjusted Catch</u>
0 - 500	22
100 - 600	101
200 - 700	231
300 - 1,000	275
400 - 1,200	380
500 - 1,500	410
600 - 2,000	465
700 - 3,000	475
1,000 - 4,000	535
1,200 - 5,000	635
1,500 - 6,000	675
2,000 - 7,000	760
3,000 - 8,000	830
4,000 - 9,000	865
5,000 - 10,000	1060
6,000 - 11,000	1140
7,000 - 12,000	1190
8,000 - 13,000	1225
9,000 - 14,000	1225
11,000 - 16,000	1260
13,000 - 16,000	1395

This suggests a 3 phase release pattern:-

An increase of 425 per 1000 from 0 - 1000 of previous release; thence an increase of 95 per 1000 in the range 1 - 9,000; thence an increase of 20 per 1000 above 9,000.

Adjustment for spore potential The mean adjusted catch on the 51 days was 580. Allowance for spore potential demands the use of factors found from the percentage of this mean, namely

Previous Release Factor	500	1000	1500	2000	2500	3000	3500	4000
	2.6	1.37	1.23	1.12	1.02	0.95	0.89	0.88
Previous Release Factor	4500	5000	5500	6000	7000	8000	9000	
	0.77	0.72	0.68	0.64	0.58	0.53	0.49	

thereafter decreasing by about 0.01 per 1000

Temperature Influence

In this model the maximum of the day in question only

was used:-

<u>Temperature Range</u>	<u>Mean catch (adjusted for potential)</u>
10 - 12	185
11 - 13	255
12 - 14	220
13 - 15	315
14 - 16	315
15 - 17	340
16 - 18	365
17 - 19	525
18 - 20	650
19 - 21	840
20 - 22	1025

This suggests a pattern of a decrease of 40 per degree below 17°C and an increase of 170 per degree above

Wind Influence

Adjusting for spore potential and day maximum and averaging:-

<u>Run-of-Wind Range</u>	<u>Mean adjusted catch</u>
50 - 100	210
60 - 110	245
70 - 120	235
80 - 130	275
90 - 140	355
100 - 150	385
110 - 160	415
120 - 170	435
130 - 180	430
140 - 190	460
150 - 200	465
160 - 210	465
170 - 220	560
180 - 230	500
260 - 280	810

This suggests a uniform variation of 30 per 10 miles run-of-wind

No improvement could be found using a sun correction

Test Using a base of 350 and adjusting from standards of 17°C and 120 miles/day, then applying the spore potential factor, estimates can now be made.

This model has certain attractive features

- a. the pollen potential curve is logical
- b. the temperature reaction is logical, although the increase over 17° (170 per degree) is high and must lead to errors due to the lack of constant relationship between screen maximum and plant temperature
- c. the uniform variation with wind is perhaps preferable to previous models including a large increase at strong winds.

The estimates are not greatly different from previous results. In the 0-250 range, 25 estimates were correct, 3 high; in the 250-1000, 9 correct 2 low and 2 high; above 1000, four were correct and six were too low.

2. A second method was examined, using only the catch taken 5, 6 and 7 plus that taken 10, 11, 12, 13 and 14 days previously, thus assuming 1 or two incubation periods only. The daily catches were adjusted for temperature (at 50 per degree) and wind (at 25 per 10 miles) only. The pollen potential analysis then became:-

<u>Previous pollen range</u>	<u>Mean adjusted catch</u>
0 - 300	65
100 - 400	175
200 - 500	260
300 - 600	330
400 - 700	360
500 - 1000	370
600 - 1500	415
700 - 2000	390
1000 - 2500	570
1500 - 3000	720
2000 - 4000	750
2500 - 5000	890
3000 - 7000	950
4000 - 7000	1170
5000 - 8000	980
6000 - 9000	1365

This also suggests 3 stages
70 per 100 from 0 - 500
17 per 100 from 500 - 5000
8 per 100 above 5000.

<u>Adjustment for spore potential</u>		The mean adjusted catch was 520 giving factors						
Previous release:	500	1000	1500	2000	2500	3000	3500	
Factor :	1.5	1.2	1.0	0.86	0.76	0.67	0.61	
Previous release:	4000	4500	5000	5500	6000	7000	8000	
Factor :	0.55	0.50	0.47	0.45	0.44	0.41	0.38	

Temperature Influence Applying the spore potential factor and averaging over ranges of day maxima, as in positions marked:-

<u>Temperature Range</u>	<u>Mean catch</u>
10 - 12	215
11 - 13	280
12 - 14	240
13 - 15	310
14 - 16	320
15 - 17	350
16 - 18	390
17 - 19	515
18 - 20	710
19 - 21	845
20 - 22	840

This suggests a decrease of 30 per degree below 17°C and an increase of 125 per degree above.

Wind Influence Adjusting for spore potential and day maximum and averaging:-

Run-of-wind range Mean adjusted catch

50 - 100	172
60 - 110	235
70 - 120	240
80 - 130	340
90 - 140	375
100 - 150	395
110 - 160	395
120 - 170	415
130 - 180	400
140 - 190	515
150 - 200	565
160 - 210	565
170 - 220	665
180 - 230	580
260 - 280	1035

This suggests a general increase of 40 per unit throughout the range, (the unit being 10 miles per day)

Test The base is now 360, and the test shows that of the 0 - 250 range, 25 were correct and 3 high; in the 250 - 1000 range, 14 were correct and one low; over 1000, 3 were correct and 7 low.

This shows an improvement over the previous method in the middle range, but less accuracy in large releases.

The detailed tests on daily values suggest that neither method is greatly misleading but that anomalous days have not been entirely eliminated, most especially the high catches on June 13 and 18. The high catches on June 2, 3 and 24 are very well estimated.

Any comment or criticism on this memorandum should be referred to the Author.

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